

## General Description

SFGMOS<sup>®</sup>

low

$R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. The low  $V_{th}$  series is specially designed to use in synchronous rectification power systems with low driving voltage.

## Features

- Low  $R_{DS(ON)}$  & FOM
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery



## Applications

- PD charger
- Motor driver
- Switching voltage regulator
- DC-DC convertor
- Switched mode power supply

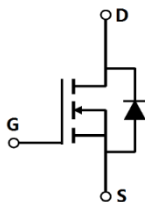
## Key Performance Parameters

| Parameter                     | Value | Unit |
|-------------------------------|-------|------|
| $V_{DS, min} @ T_{j(max)}$    | 100   | V    |
| $I_{D, pulse}$                | 210   | A    |
| $R_{DS(ON) max} @ V_{GS}=10V$ | 10    |      |
| $Q_g$                         | 49.9  | nC   |

## Marking Information

| Product Name | Package | Marking   |
|--------------|---------|-----------|
| SFG10R10DF   | TO252   | SFG10R10D |

## Package & Pin information



**Absolute Maximum Ratings** at  $T_j=25^{\circ}\text{C}$  unless otherwise noted

| Parameter   | Symbol          | Value      | Unit               |
|---|-----------------|------------|--------------------|
| Drain source voltage  | $V_{DS}$        | 100        | V                  |
| Gate source voltage   | $V_{GS}$        | $\pm 20$   | V                  |
| Continuous drain current <sup>1)</sup> , $T_C=25^{\circ}\text{C}$         | $I_D$           | 70         | A                  |
| Pulsed drain current <sup>2)</sup> , $T_C=25^{\circ}\text{C}$             | $I_{D, pulse}$  | 210        | A                  |
| Continuous diode forward current <sup>1)</sup> , $T_C=25^{\circ}\text{C}$ | $I_S$           | 70         | A                  |
| Diode pulsed current <sup>2)</sup> , $T_C=25^{\circ}\text{C}$             | $I_{S, Pulse}$  | 210        | A                  |
| Power dissipation <sup>3)</sup> , $T_C=25^{\circ}\text{C}$                | $P_D$           | 125        | W                  |
| Single pulsed avalanche energy <sup>5)</sup>                              | $E_{AS}$        | 100        | mJ                 |
| Operation and storage temperature   | $T_{stg}$ $T_j$ | -55 to 150 | $^{\circ}\text{C}$ |

**Thermal Characteristics**

| Parameter  | Symbol | Value | Unit                 |
|--|--------|-------|----------------------|
| Thermal resistance, junction-case                  | R      | 1     | $^{\circ}\text{C/W}$ |
| Thermal resistance, junction-ambient <sup>4)</sup> | R      | 62    | $^{\circ}\text{C/W}$ |

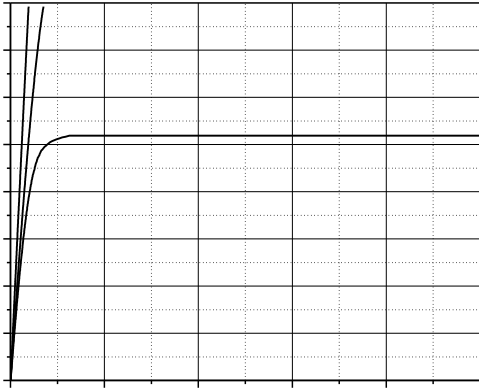
**Electrical Characteristics** at  $T_j=25^{\circ}\text{C}$  unless otherwise specified

| Parameter                        | Symbol       | Min. | Typ. | Max. | Unit | Test condition                              |
|----------------------------------|--------------|------|------|------|------|---|
| Drain-source breakdown voltage   | $BV_{DSS}$   | 100  |      |      | V    | $V_{GS}=0\text{ V}$ , $I_D=250\text{ A}$    |
| Gate threshold voltage           | $V_{GS(th)}$ | 1.0  |      | 2.5  | V    | $V_{DS}=V_{GS}$ , $I_D=250\text{ A}$        |
| Drain-source on-state resistance | $R_{DS(ON)}$ |      | 8.5  | 10.0 |      | $V_{GS}=10\text{ V}$ , $I_D=10\text{ A}$    |
| Drain-source on-state resistance | $R_{DS(ON)}$ |      | 9.5  | 12.0 |      | $V_{GS}=4.5\text{ V}$ , $I_D=10\text{ A}$   |
| Gate-source leakage current      | $I_{GSS}$    |      |      | 100  | nA   | $V_{GS}=20\text{ V}$                        |
|                                  |              |      |      | -100 |      | $V_{GS}=-20\text{ V}$                       |
| Drain-source leakage current     | $I_{DSS}$    |      |      | 1    | A    | $V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ |
| Gate resistance                  | $R_G$        |      | 4.5  |      |      |   |

**Dynamic Characteristics**

| Parameter         | Symbol    | Min. | Typ. | Max. | Unit | Test condition |
|-------------------|-----------|------|------|------|------|----------------|
| Input capacitance | $C_{iss}$ |      | 2604 |      | pF   |                |

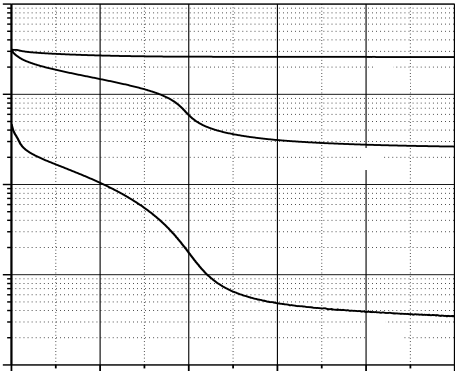
**Electrical Characteristics Diagrams**



**Figure 1. Typ. output characteristics**



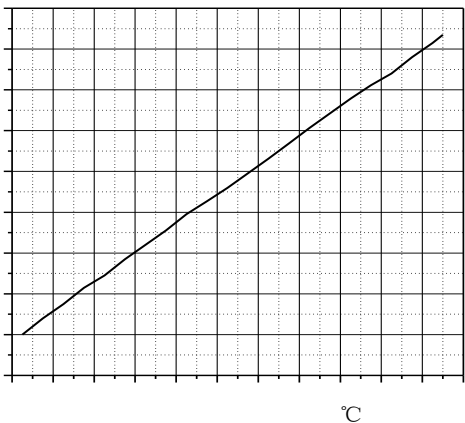
**Figure 2. Typ. transfer characteristics**



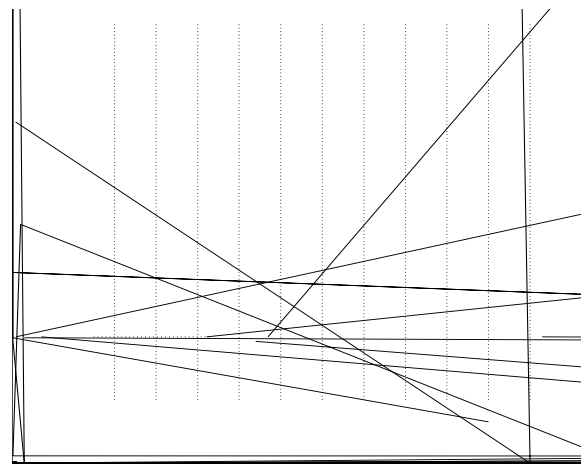
**Figure 3. Typ. capacitances**



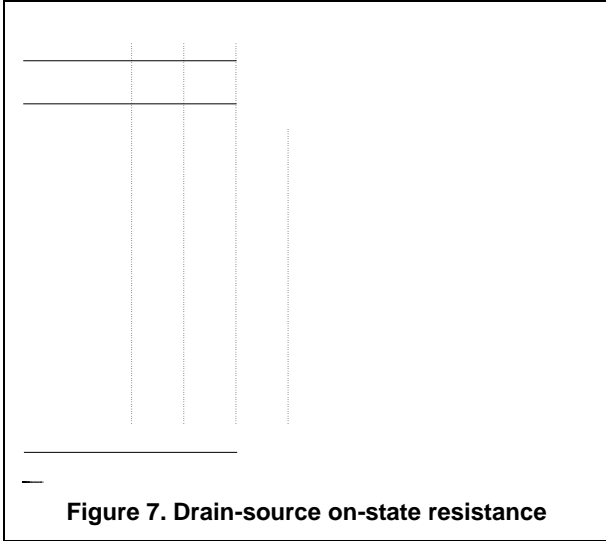
**Figure 4. Typ. gate charge**



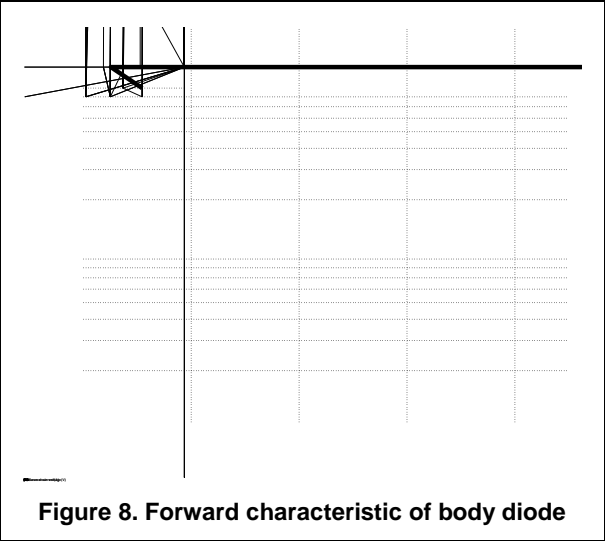
**Figure 5. Drain-source breakdown voltage**



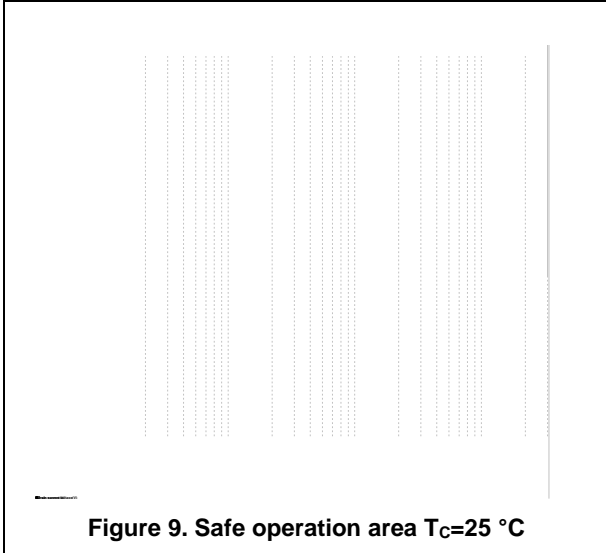
**Figure 6. Drain-source on-state resistance**



**Figure 7. Drain-source on-state resistance**

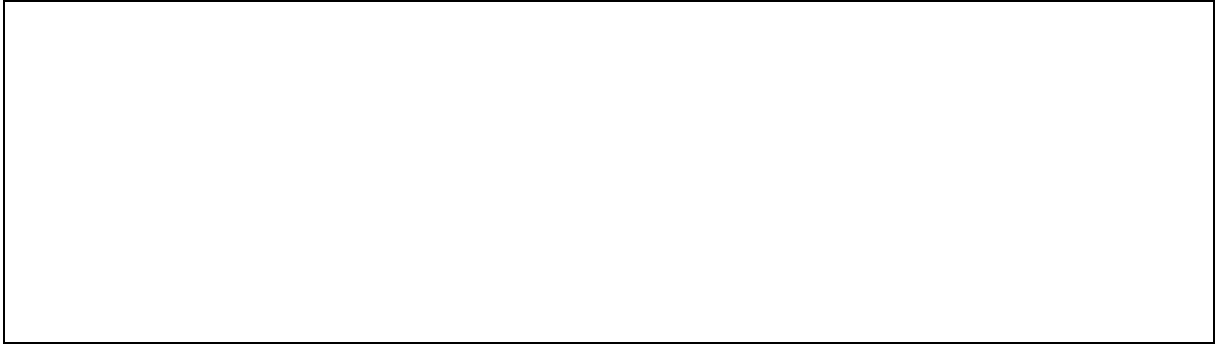


**Figure 8. Forward characteristic of body diode**

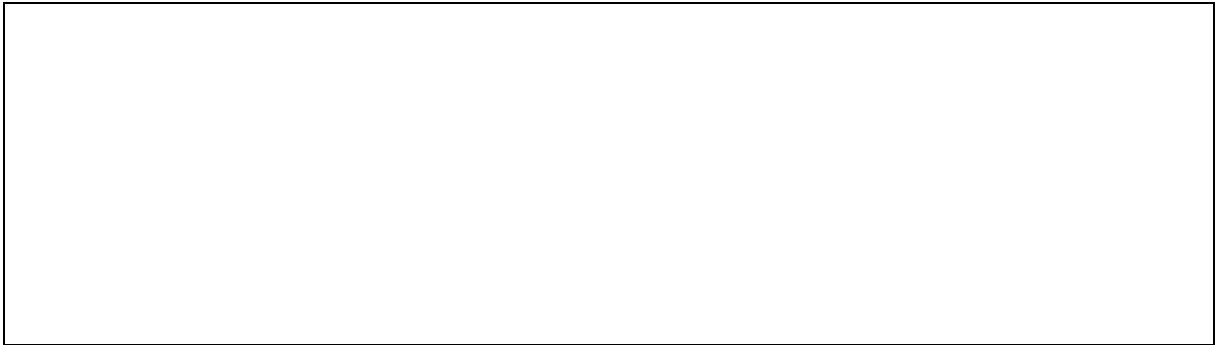


**Figure 9. Safe operation area  $T_C=25\text{ }^\circ\text{C}$**

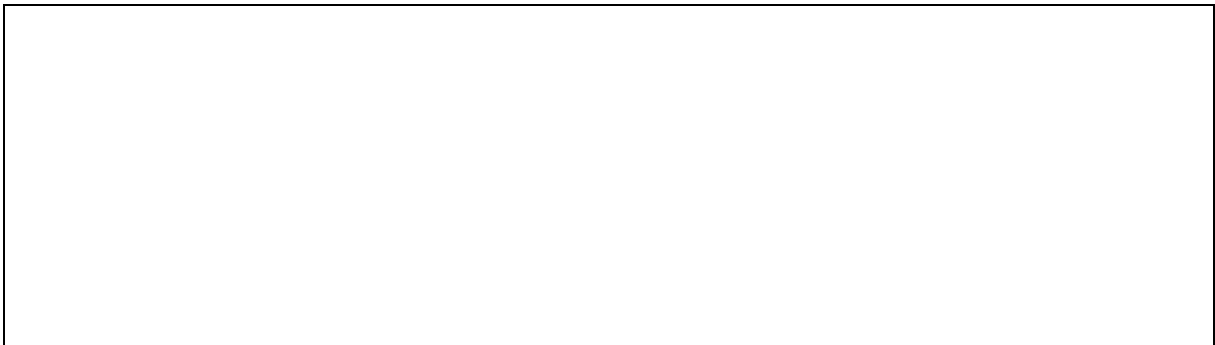
## Test circuits and waveforms



**Figure 1. Gate charge test circuit & waveform**



**Figure 2. Switching time test circuit & waveforms**

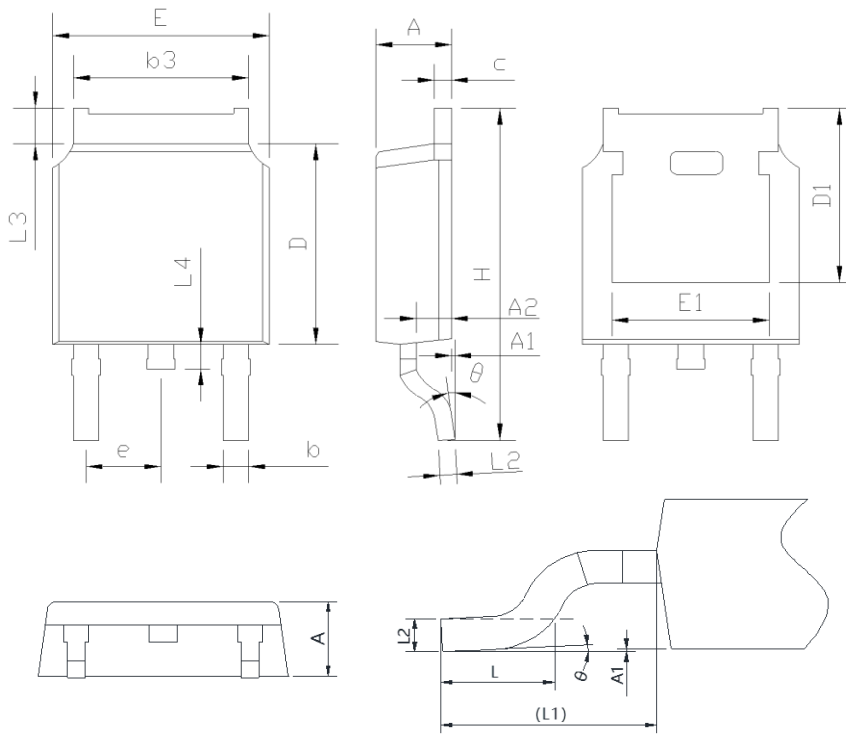


**Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms**



**Figure 4.**

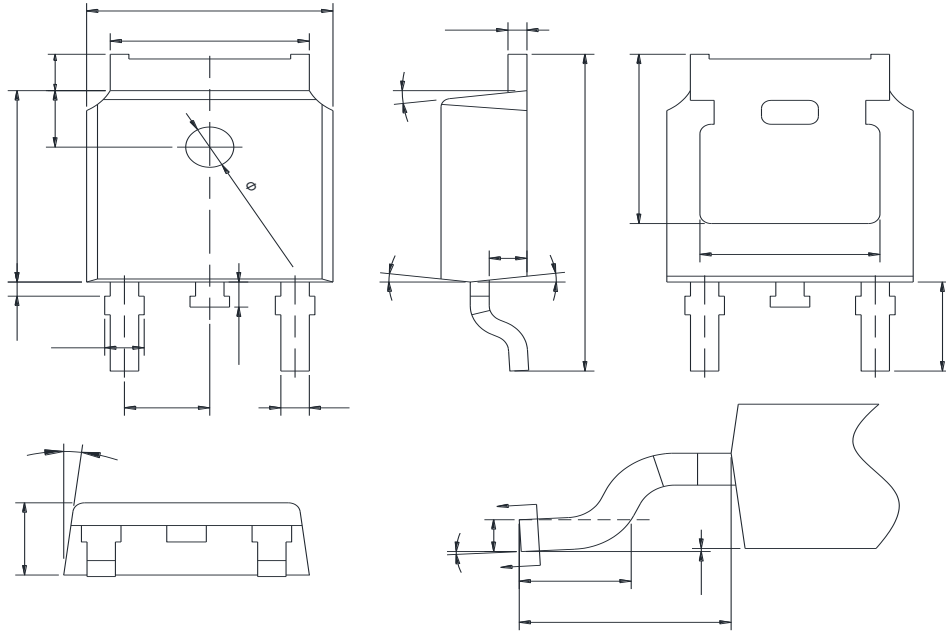
**Package Information**



| Symbol | mm        |       |       |
|--------|-----------|-------|-------|
|        | Min       | Nom   | Max   |
| A      | 2.20      | 2.30  | 2.38  |
| A1     | 0.00      | -     | 0.20  |
| A2     | 0.97      | 1.07  | 1.17  |
| b      | 0.68      | 0.78  | 0.90  |
| b3     | 5.20      | 5.33  | 5.46  |
| c      | 0.43      | 0.53  | 0.61  |
| D      | 5.98      | 6.10  | 6.22  |
| D1     | 5.30 REF  |       |       |
| E      | 6.40      | 6.60  | 6.73  |
| E1     | 4.63      | -     | -     |
| e      | 2.286 BSC |       |       |
| H      | 9.40      | 10.10 | 10.50 |
| L      | 1.38      | 1.50  | 1.75  |
| L1     | 2.90 REF  |       |       |
| L2     | 0.51 BSC  |       |       |
| L3     | 0.88      | -     | 1.28  |
| L4     | 0.50      | -     | 1.00  |
|        | 0         | -     |       |

Version 1: TO252-C package outline dimension

**Package Information**



| Symbol | mm        |       |       |
|--------|-----------|-------|-------|
|        | Min       | Nom   | Max   |
| A      | 2.20      | 2.30  | 2.38  |
| A1     | 0.00      | -     | 0.10  |
| A2     | 0.90      | 1.01  | 1.10  |
| b      | 0.72      | -     | 0.85  |
| b1     | 0.71      | 0.76  | 0.81  |
| b2     | 0.72      | -     | 0.90  |
| b3     | 5.13      | 5.33  | 5.46  |
| c      | 0.47      | -     | 0.60  |
| c1     | 0.46      | 0.51  | 0.56  |
| c2     | 0.47      | -     | 0.60  |
| D      | 6.00      | 6.10  | 6.20  |
| D1     | 5.25      | -     | -     |
| E      | 6.50      | 6.60  | 6.70  |
| E1     | 4.70      | -     | -     |
| e      | 2.186     | 2.286 | 2.386 |
| H      | 9.80      | 10.10 | 10.40 |
| L      | 1.40      | 1.50  | 1.70  |
| L1     | 2.90 REF  |       |       |
| L2     | 0.508 BSC |       |       |
| L3     | 0.90      | -     | 1.25  |
| L4     | 0.60      | 0.80  | 1.00  |
| L5     | 0.15      | -     | 0.75  |
| L6     | 1.80 REF  |       |       |
|        | 0         | -     |       |
|        |           |       |       |
|        |           |       |       |

Version 2: TO252-J package outline dimension



### Ordering Information

| Package Type | Units/ Reel | Reels / Inner Box | Units/ Inner Box | Inner Boxes/ Carton Box | Units/ Carton Box |
|--------------|-------------|-------------------|------------------|-------------------------|-------------------|
| TO252-C      | 2500        | 2                 | 5000             | 5                       | 25000             |
| TO252-J      | 2500        | 2                 | 5000             | 5                       | 25000             |

### Product Information

| Product    | Package | Pb Free | RoHS | Halogen Free |
|------------|---------|---------|------|--------------|
| SFG10R10DF | TO252   | yes     | yes  | yes          |

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